ESSENTIAL QUESTIONS

- How do you describe the position of a point in a plane using distance and angle?

- How do can you use the graphs of polar equations do create a unique design?

LEARNING GOALS

- SWBAT:
  - Convert between rectangular and polar coordinates to represent equations of polar and rectangular graphs on the corresponding graphing plane.

CLASS AGENDA

- Polar Coordinates
- Converting
- Break
- Graphing on a Polar Axis
- Homework

ANTICIPATORY SET

- How do you describe coordinates on the Cartesian Coordinate plane?
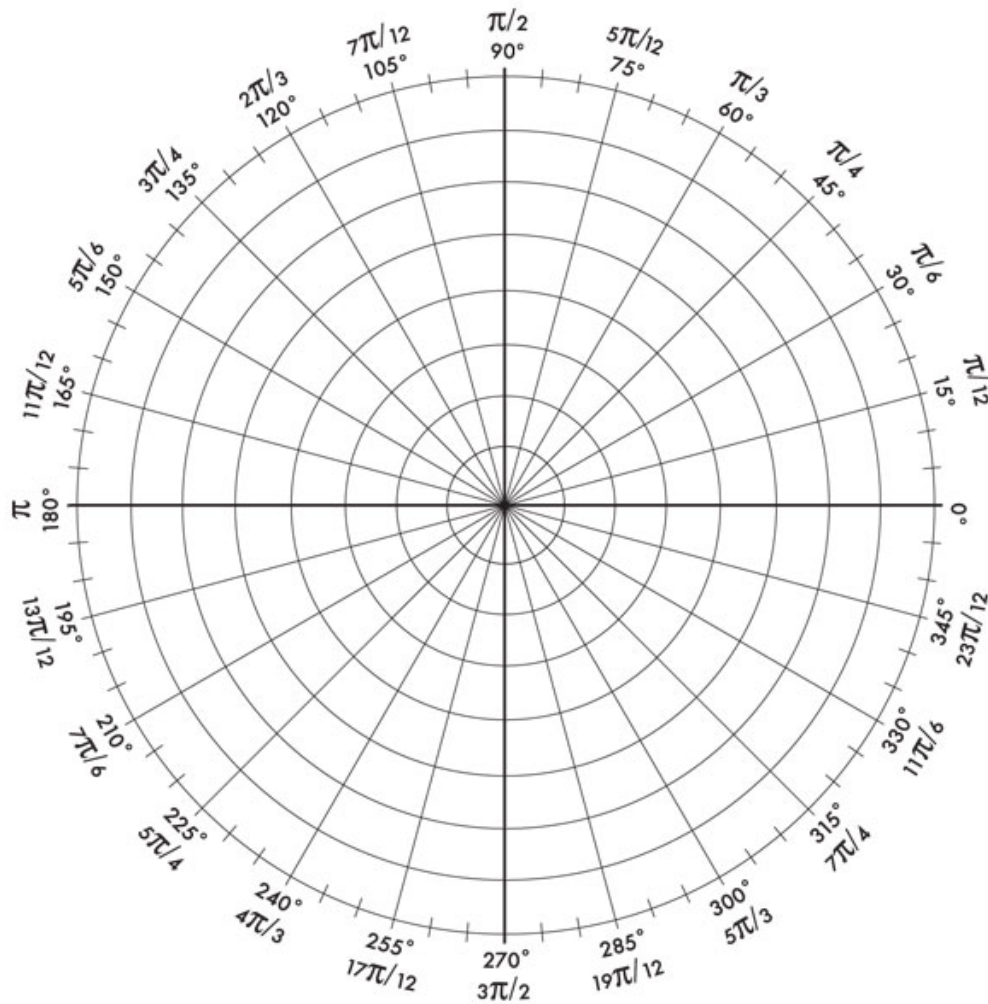
- Example: Describe (-4, 3)

POLAR COORDINATES

- Use the modulus (r) to describe directed distance

- Use (Θ) to describe the directed angle

- (r, Θ) are my coordinates

Note: because r is a directed distance, we only use $|r|$ to plot.

-r means that it is a reflection 180°

GRAPH

Center "O" is called the pole

Each concentric circle is a distance from the center or (r)

Directed angle measured counterclockwise from the positive x-axis

DESCRIBE THE FOLLOWING

- Polar Coordinates:

1. $(3, 30°)$
2. $(-4, 120°)$
3. $\left(6, \dfrac{5\pi}{3}\right)$
4. $\left(-8, \dfrac{23\pi}{12}\right)$

MULTIPLE REPRESENTATION

- Because we are using $|r|$ and we can represent the same angle using coterminal angles, there are AN INFINITE number of ways to represent the same coordinate

COORDINATE CONVERSION

The polar coordinates (r, Θ) are related to the rectangular coordinates (x, y) as follows:	
$x = r\cos\theta$	$\tan\theta = \dfrac{y}{x}$
$y = r\sin\theta$	$r = \sqrt{x^2 + y^2}$

POLAR-TO-RECTANGULAR

1. $\left(3, \frac{5\pi}{6}\right)$

2. $\left(-1, -\frac{\pi}{3}\right)$

3. $\left(\sqrt{3}, \frac{5\pi}{6}\right)$

4. $\left(\frac{3}{2}, -\frac{3\pi}{2}\right)$

RECTANGULAR-TO-POLAR

1. $(-7, 0)$
2. $(1, 1)$
3. $(-\sqrt{3}, -\sqrt{3})$
4. $(6, 9)$

BREAK

GRAPHING ON A POLAR AXIS

- General equations for polar graphs:

- $r = a \pm b \sin n\theta$

- $r = a \pm b \cos n\theta$

- What affects do they have on the graph?

- a?
- b?
- n?

GRAPHING ON POLAR AXIS

Examples:

Create a table of values for each angle and each "r"

1. $r = \sin \theta$

2. $r = 2\cos 4\theta$

3. $r = 1 - \sin 2\theta$

4. $r = 2 + \cos 3\theta$

CLOSURE

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